EPSC Abstracts
Vol. 6, EPSC-DPS2011-1151, 2011
EPSC-DPS Joint Meeting 2011

Gravitational features of (21)Lutetia, evidence for differentiation ?

J.-B. Vincent(1), H. Sierks(1), B. Weiss(2), and the OSIRIS team.
(1) Max-Planck-Institut für Sonnensystemforschung, Max Planck Strasse, 2, 37191, Katlenburg-Lindau, Germany, (vincent@mps.mpg.de)
(2) Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA, USA

Abstract

In July 2010, the fly-by of asteroid (21)Rosetta by ESA's spacecraft Rosetta revealed a surface with complex geomorphological features and a density of 3.4 g.cm^3 ([1]), which exceeds the value known for most known chondritic meteorite groups. So far, partially differentiated bodies have not yet been unambiguously identified in the asteroid belt. The high bulk density of Lutetia, in context with surface properties resembling those of carbonaceous or enstatite chondrites, suggests that Lutetia might have experienced partial differentiation that lead to the formation of a metallic core. This theory was developped by Weiss et al ([2]). The present work follows up and expands this idea through gravitational considerations. We will report here on the gravity field model of Lutetia for different possible inner structures (pure rock, iron core + rock, several layers, ...), the distribution of local slopes angles with respect to the gravity, and discuss whether the features we observe (for instance dry granular flows) are compatible with one or the other interior model of the asteroid.

References

[1] Sierks et al, Science, 2011, submitted

[2] Weiss et al, PSS, 2011, submitted

[3] Jorda et al, AAS DPS meeting #42, 2010

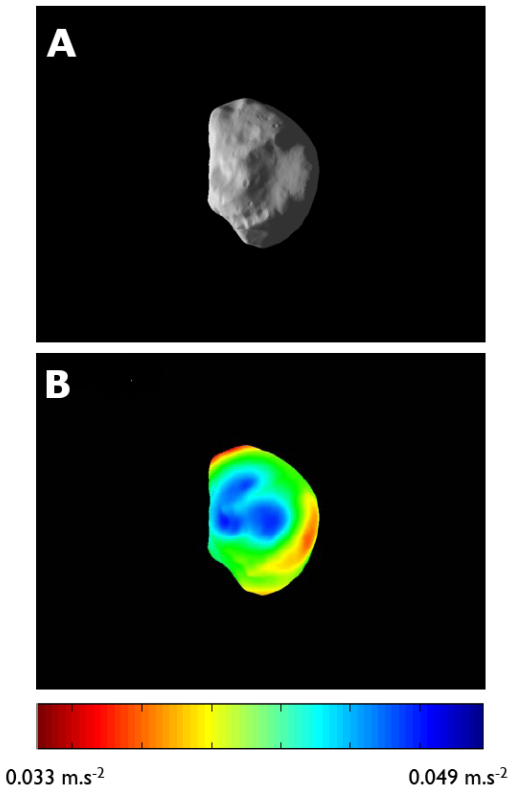

Figure 1: Panel A: shape model of Lutetia by Jorda et al ([3]). Panel B: Gravity model of Lutetia assuming an homogeneous density of 3.4 g.cm^3.